

BASIC MICROBIOLOGY SERIES

Introduction to Modern Virology

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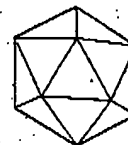
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Family: Reoviridae (class III)

10–12 segments of double-stranded RNA of total M_r 12–20 $\times 10^6$. Particle is a 60–80 nm icosahedron. Has an isometric nucleocapsid with transcriptase activity. Cytoplasmic multiplication.

Genera: Reovirus – of vertebrates
 Orbivirus – of vertebrates, but also multiply in insects
 Rotavirus – of vertebrates
 Cytoplasmic polyhedrosis viruses – of insects
 Phytoreovirus – clover wound-tumour virus
 Fijivirus – Fiji disease of plants



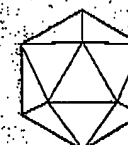
See: Estes, M. K. & Cohen, J. (1989) Rotavirus gene structure and function. *Microbiological Reviews*, 53, 410–449.
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 Roy, P. & Gorman, B. M. (1990) Bluetongue viruses. *Current Topics in Microbiology and Immunology*, 162, 1–200.

Family: Birnaviridae (class III)

Two segments of double-stranded RNA of M_r 2.5 $\times 10^6$ and 2.3 $\times 10^6$ in one 60 nm particle. Icosahedral with 45 nm core. RNA transcriptase present. Cytoplasmic.

Genus: Birnavirus (pancreatic necrosis virus of fish; infectious bursal disease of chickens; *Drosophila* X virus)

See: Becht, H. (1980) Infectious bursal disease virus. *Current Topics in Microbiology and Immunology*, 90, 107–121.



Family: Picornaviridae (class IV)

Single-stranded RNA of M_r 2.5 $\times 10^6$. Icosahedral particles of 30 nm. Multiplication is cytoplasmic.

Genera: Enterovirus (acid-resistant, primarily viruses of gastrointestinal tract)
 Rhinovirus (acid-labile, mainly viruses of upper respiratory tract)
 Aphthovirus (foot-and-mouth disease virus)
 Cardiovirus (encephalomyocarditis [EMC] virus of mice)
 Hepatitis A virus (of humans)
 Also various viruses of insects



See: Macnaughton, M. R. (1982) The structure and replication of rhinoviruses. *Current Topics in Microbiology and Immunology*, 97, 1–26.

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The classification and nomenclature of viruses 345

Subfamily: *Betaherpesvirinae*

Human cytomegalovirus

Mouse cytomegalovirus

Subfamily: *Gammaherpesvirinae* (lymphoproliferative viruses)

Epstein-Barr virus

Herpesvirus saimiri

Unclassified: Marek's disease virus

See: Davison, A. J. (1991) Varicella-zoster virus. *Journal of General Virology*, 72, 475-486.

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Rouse, B. T. (1992) Herpes simplex virus: pathogenesis, immunobiology and control. *Current Topics in Microbiology and Immunology*, 179, 1-179.

Stevens, J. G. (1989) Human herpesviruses: a consideration of the latent state. *Microbiological Reviews*, 53, 318-332.

Family: *Adenoviridae* (class I)

Double-stranded DNA of M_r 20-30 $\times 10^6$. Particle is a 70-90 nm icosahedron which replicates and is assembled in the nucleus.

Genera: Mastadenovirus (adenoviruses of mammals)

Aviadenovirus (adenoviruses of birds)

See: Doefler, W. (ed.) (1983/1984) The molecular biology of adenoviruses. *Current Topics in Microbiology and Immunology*, 109 (1983), 110, 111 (1984).

Ginsberg, H. S. (ed.) (1984) *The adenoviruses*. New York: Plenum Press.

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Family: *Papovaviridae* (class I)

Double-stranded circular DNA. Particles have 72 capsomers in a skew arrangement and are assembled in the nucleus. Haemagglutinate. Oncogenic.

Genera: Papillomavirus (producing papillomas in several mammalian species including man) 50-55 nm particle, DNA 5×10^6 M_r . Polyomavirus (found in rodents, humans and other primates) 40-45 nm particle, DNA 3×10^6 M_r . Includes simian virus type 40 (SV40) and polyomavirus itself

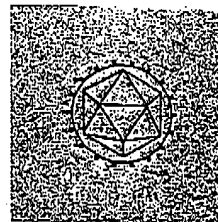
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- See: Lambert, P. F. (1991) Papillomavirus DNA replication. *Journal of Virology*, 65, 3417-3420.
- Salzman, N. P. (1986) *The Papovaviridae*, Vol. 1, *The polyomaviruses*. New York: Plenum Press.
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Family: Hepadnaviridae (class I)

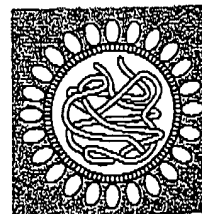
One complete DNA minus strand of $M_r 1 \times 10^6$ with a 5' terminal protein. DNA is circularized by an incomplete plus strand of variable length (50-100%) which overlaps the 3' and 5' termini of DNA minus. There is a 42 nm enveloped particle containing a core with DNA polymerase and protein kinase activities. Includes hepatitis B (HBV) of humans, Pekin duck hepatitis, beechy ground squirrel hepatitis and woodchuck hepatitis viruses. HBV is strongly associated with liver cancer.



- See: Ganem, D. & Varmus, H. E. (1987) The molecular biology of the hepatitis B viruses. *Annual Review of Biochemistry*, 56, 651-693.
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- Tiollais, P., Pourcel, C. & Dejean, A. (1985) The hepatitis B virus. *Nature (London)*, 317, 489-495.

Family: Coronaviridae (class IV)

Single-stranded RNA of $M_r 2-11 \times 10^6$. Enveloped particles of 60-220 nm with club-shaped sparse spikes. Contains a helical nucleocapsid 9 nm diameter. Cytoplasmic, budding from Golgi and endoplasmic reticulum.



- Genera: Coronavirus (avian infectious bronchitis virus and related viruses, including equine arteritis virus)
- Torovirus (enveloped biconcave 130 nm particles with spikes. Helical nucleocapsid. Nucleus required for replication. Berne virus of horses).

- See: Horzinek, M. C. et al. (1987) A new family of vertebrate viruses: Toroviridae. *Intervirology*, 27, 17-24.
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